USDA
NATURAL RESOURCES
CONSERVATION SERVICE

DELAWARE CONSERVATION
PRACTICE STANDARD

CRITICAL AREA PLANTING

CODE 342
(Reported by Acre)

DEFINITION

Planting vegetation, such as trees, shrubs, vines, grasses, or legumes on highly erodible or critically eroding areas.

PURPOSES

This practice may be applied for one or more of the following purposes:

- To reduce soil erosion by wind and water;
- To improve water quality by reducing off-site sediment movement;
- To improve wildlife habitat and visual resources.

CONDITIONS WHERE PRACTICE APPLIES

This practice applies to all land uses where soil stabilization requires using specialized plant species and establishment methods.

Examples of applicable areas include conservation structures, embankments, cuts, fills, mined areas, roadsides, landfills, spoilbanks, filter strips, and recreation areas.

This practice does not apply to tree plantings that are primarily intended for production of timber and other forest products.

CONSIDERATIONS

Assess site conditions including surrounding land uses, soils, available moisture during the growing season, and existing vegetation on the site and in adjacent areas, including any noxious weeds that may be present.

Consider the need for structural practices, in addition to this vegetative practice, to stabilize a critically eroding site.

Consider the time of year for installation of this practice. Avoid periods of high runoff velocities or temporarily divert runoff from the planted area. This will allow the vegetation to become well established before it is subjected to storm flows.

Consider the long-term maintenance requirements of the established vegetation.

This practice has the potential to affect National Register listed cultural resources or eligible (significant) cultural resources. These may include archeological, historic, or traditional cultural properties. Care should be taken to avoid adverse impacts to these resources. Follow NRCS state policy for considering cultural resources during planning.

CRITERIA

Select species based on their adaptability to the environmental conditions present and to the planned land use.

Species shall be selected based on:

1. Climatic conditions, such as annual and seasonal rainfall, growing season length, humidity, and USDA Plant Hardiness Zones (see Figure 1);

2. Soil and site conditions such as drainage class, pH, available water holding capacity, slope, aspect, shade, inherent fertility, salinity or alkalinity, flooding or ponding, and levels of toxic elements such as aluminum and heavy metals;

3. Plant characteristics, such as:

    a. Ease of establishment, persistence, and time needed for full stand establishment;

    b. Growth habit (e.g., sod or bunch) as it relates to surface cover;

    c. Rooting depth as it relates to slope stability;

    d. Resistance to dislodgment by flowing water or wave action at various velocities and depths;

    e. Season of growth (warm or cool) and life cycle (annual, perennial, or biennial);

    f. Fertility and management requirements;

    g. Visual appeal;

    h. Suitability as wildlife food and/or cover.

Select plant species that are native to Delaware or are introduced and are non-invasive (i.e., not likely to spread beyond the planted area and displace native species). Selection of native species shall be a priority when feasible.

Site preparation and planting to establish vegetative cover shall be done at a time and manner to insure survival and growth of selected species. Supplemental moisture shall be applied when necessary to assure early survival and establishment of selected species.

Only viable, high quality seed and planting stock shall be used. The method of planting shall include hand or machine planting techniques suited to achieving proper depths and placement for the selected plant species.

Livestock shall be controlled or excluded as necessary to establish and maintain the vegetative cover to meet its intended purpose.

Plant and animal pest species shall be controlled as necessary to achieve and maintain the intended purpose of the vegetative cover.

Noxious weeds shall be controlled as required by state law.

Note: Specific program requirements may dictate criteria in addition to those specified above.

PLANS & SPECIFICATIONS

Plans and specifications for critical area planting shall be prepared in accordance with the previously listed criteria. Plans and specifications shall contain sufficient detail concerning site preparation and establishment to ensure successful management of the practice. Appropriate conservation practice standards shall be used for designing and installing structural and vegetative measures. Documentation shall be in accordance with the section "Supporting Data and Documentation" in this standard.

Grading Plan. The grading plan and practice installation shall be based upon adequate topographic surveys and investigations. The plan shall show the location, slope, cut, fill, and finish elevation of the surfaces to be graded. The plan shall also include auxiliary practices for safe disposal of runoff water, slope stabilization, erosion control, and drainage. Practices such as waterways, ditches, diversions, grade stabilization structures, retaining walls, and subsurface drains shall be included where necessary.

Site Preparation. Timber, logs, brush, rocks, stumps, and vegetative matter that will interfere with the grading operation or affect the planned stability of fill areas shall be removed and disposed of according to the plan.

Topsoil shall be stripped and stockpiled in amounts necessary to complete finish grading of all exposed areas requiring topsoil. A minimum 4-inch stripping depth shall be used, depending on the particular soil.

Fill material shall be free of brush, rubbish, timber, logs, stumps, and other vegetative matter in amounts that is detrimental to constructing stable fills.

All disturbed areas should be left with a generally smooth finish and shall be protected from erosion.

Provisions shall be made to safely conduct surface water to storm drains or suitable watercourses and to prevent surface runoff from damaging cut faces and fill slopes.

In areas having a high water table, subsurface drainage shall be provided to intercept seepage that would adversely affect slope stability, building foundations, or create undesirable wetness.

Adjoining properties shall be protected from sedimentation associated with construction activities.

Fill shall not be placed adjacent to the bank of a stream or channel unless provisions are made to protect the hydraulic, biological, aesthetic, and other environmental functions of the stream.

Soil Amendments. Soil tests shall be made to determine the optimum recommendations for both lime and fertilizer. Soil analysis shall be performed by a soil testing laboratory that has been accredited by the North American Proficiency Testing Program, preferably the University of Delaware Soil Testing Laboratory. At a minimum, soil samples taken for nutrient and pH analysis shall be from the soil layer that will be used as the surface layer (top 4 to 6 inches) for seeding.

Lime. Lime shall be applied to achieve a soil pH of 6.0 – 6.5, except for warm season grasses (5.5 – 6). Lime materials shall be ground agricultural limestone that contains at least 50% total oxides (calcium plus magnesium oxide). Hydrated lime may be substituted for agricultural lime, except in hydroseeding applications. Do not use burnt lime as a soil amendment.

Pulverized limestone shall be ground to such fineness that at least 50% will pass through a 100-mesh sieve and at least 98% will pass through a 20-mesh sieve. Pulverized limestone shall be applied with a drop spreader when high winds will not interfere with uniform distribution of the material or cause nuisance dust. Pulverized limestone may also be included in a hydroseeding slurry.

Granular limestone shall be of such fineness that at least 30% will pass through a 100-mesh sieve, at least 50% through a 60-mesh sieve, and at least 98% through a 20-mesh sieve. Granular limestone shall be applied with a drop or rotary spreader, but shall not be included in a hydroseeding slurry.

Pelletized limestone, a product composed of pellets of pulverized limestone, shall be of a pellet type and size that is recommended by the manufacturer for use with turfgrass. The limestone used in the manufacture of the pelletized limestone product shall meet the minimum fineness requirements for pulverized limestone. Pelletized limestone shall be applied with a drop or rotary spreader, or shall be included in a hydroseeding slurry.

When a soil test is not feasible, lime shall be applied according to the rates specified as follows:

Soil Texture	**Limestone Application Rate**	
	Tons/Acre	Lbs./1,000 SF
Clay, clay loam, and highly organic soil	3	135
Sandy loam, loam, silt loam	2	90
Loamy sand, sand	1	45

Limestone applied at rates greater than 50 pounds per 1,000 square feet (or greater than 1 ton per acre) shall be incorporated into the upper 4 to 6 inches of the soil. Limestone applied at lower rates may be incorporated or left on the soil surface.

Fertilizer. Fertilizer shall be applied to prepared seedbeds, based on soil test results. Fertilizer applied without a soil test may result in an inefficient quantity of nutrients for plant establishment or could result in overapplication of nutrients leading to potential water quality problems and excessive weed growth. However in circumstances when obtaining a soil test is not feasible, the following rates shall be used:

1. Cool-season grass: 500 pounds per acre (or 10 pounds per 1,000 square feet) of 10-20-20 or equivalent;

2. Cool-season grass + legume: 500 pounds per acre (or 10 pounds per 1,000 square feet) of 5-20-20 or equivalent;

3. Warm-season grass or warm-season/ cool-season grass mixes: 500 pounds per acre (or 10 pounds per 1,000 square feet) of 0-10-10 or equivalent. Nitrogen is generally not recommended for use during the establishment of warm-season grass because it encourages increased weed competition. However on sites with low fertility and minimal likelihood of weed competition, 30 pounds per acre (0.7 pound per 1,000 square feet) of slow-release N may be applied at the time of planting or 40 pounds per acre (1 pound per 1,000 square feet) of soluble N after grass emergence.

4. Warm-season grass + legume, or warm-season/cool-season grass mixes + legumes: 500 pounds per acre (or 10 pounds per 1,000 square feet) of 0-10-10 or equivalent. On low fertility sites where there is minimal weed competition, apply 20 pounds per acre (0.5 pound per 1,000 square feet) of N after emergence.

All fertilizer shall be uniform in composition, free flowing, and suitable for application by approved equipment. Fertilizers shall be delivered to the site fully labeled according to applicable state fertilizer laws and shall bear the name, trade name, or trademark and warranty of the producer. Slow-release forms of nitrogen shall be used when feasible to provide nitrogen over a longer period of time, and to reduce nitrogen leaching and runoff.

Organic Amendments. Apply manure and compost at a rate based on soil test results and a nutrient analysis of that material. Organic amendments to sites shall be recommended only after an evaluation of any potential water quality hazards. Organic amendments shall be incorporated to the extent practical into the upper 4 to 6 inches of the soil with a disk, springtooth harrow, or other suitable equipment.

Topsoil. Topsoil shall be added to a site when needed to improve the soil medium for plant establishment and growth. The use of topsoil shall be limited to slopes that are 2:1 or flatter.

Exposed soils shall be topsoiled if they have one or more of the following limiting factors:

1. Very shallow to bedrock or other restrictive layer (e.g., the subsoil is less than 6 inches deep);

2. Extremely acidic (pH less than 5.0); or,

3. Extremely salty (conductivity greater than 500 parts per million, or 4.0 millisiemens per centimeter).

Topsoil shall also be used when assurance of improved vegetative growth is desired.

Topsoil Quality. Topsoil shall be friable and loamy, free of debris, stones, or other materials larger than 1.5 inches in diameter. It shall be free of any known viable seeds or plant parts of objectionable weeds such as Johnsongrass, shattercane, thistle, multiflora rose, or others as specified.

Topsoil shall contain no toxic substance that may be harmful to plant growth. Soluble salts shall not be excessive (concentration greater than 500 parts per million). A pH range of 5.5 to 7.5 is required. If pH is less than 5.5, lime shall be applied and incorporated with the topsoil to adjust the pH between 6 – 6.5, except for native grasses (5.5 – 6.0). Topsoil hauled in from off-site shall have a minimum organic matter content of 1% by weight, based on soil test results.

Topsoil Application. Before topsoiling, the exposed subsoil shall be tested for pH. Where the subsoil is highly acidic, ground limestone shall be added at the rate of 4 to 8 tons per acre (200 to 400 pounds per 1,000 square feet). Lime shall be distributed uniformly and worked into the subsoil as previously described in the section concerning soil amendments.

Immediately before spreading topsoil, the subsoil shall be loosened by disking or scarifying to provide a good bond for the topsoil. Where the slope of the site is flatter than 3:1, loosen the subsoil to a minimum average depth of 2 inches. On steeper slopes (up to 2:1), loosen the subsoil to a depth of 0.5 to 1 inch or use a bulldozer to track up and down slope to create horizontal check slots that will prevent topsoil from sliding down the slope.

Topsoil shall only be handled when it is dry enough to work (less than field capacity) without damaging soil structure.

Topsoil shall be uniformly applied in a 5 to 8 inch layer, and lightly compacted to a minimum thickness of 4 inches. Subsoil with a pH of 4.0 or less, or containing iron sulfide, shall be covered with a minimum depth of 12 inches of topsoil.

Topsoil shall not be spread when the land is partly frozen or muddy or on frozen slopes covered with ice or snow.

Topsoil placed on slopes greater than 5% shall be promptly limed and fertilized (if needed), seeded, mulched, and tracked with suitable equipment.

Seedbed Preparation. Seedbed preparation shall be done when the soil is moist, but not wet. Lime, fertilizer, and other soil amendments shall be evenly applied where needed on the site, as described in previous sections of this standard. Either dry or wet application methods may be suitable.

Slopes flatter than 3:1. Seedbed preparation shall consist of working the soil to a depth of 3 to 5 inches with a disk or similar equipment. Continue tillage until a reasonably uniform seedbed is prepared.

Slopes 3:1 or steeper. Scarify the soil surface with a bulldozer, heavy chain, hand tools, or other equipment that will loosen the soil 0.5 to 1 inch deep. After the soil is loosened, it shall not be worked completely smooth, but left in a somewhat roughened condition. The final surface preparation shall be generally on the contour.

Seed Quality and Treatment. All seed shall be labeled and meet the requirements of the Delaware Seed Law. Refer to Table 5 for minimum germination and purity requirements. Seed shall have had a germination test within 12 months prior to the date of sowing. Use of certified seed shall be preferred. Seed shall be kept cool and dry until planted.

Species with seed lots greater than 50% hard seed shall be dehulled and/or scarified and planted no later than 60 days after scarification.

Grasses that have fluffy seeds shall be planted using specially designed native seed drills. Alternatively, beards or awns shall be mechanically removed from such seeds to facilitate movement through conventional seeding equipment.

Grass seed (perennial ryegrass, fine fescues, and tall fescue) enhanced with endophytes, a naturally occurring fungus, shall only be used when establishing a managed turfgrass, such as a lawn, athletic field, or recreational area. The endophytes protect the grass from insect and disease damage but are potentially harmful to wildlife if the seed or plant is eaten. Conservation seedings should be made with low (<5%) or endophyte-free grass cultivars. Refer to Appendix B for guidance on selecting the appropriate cultivar.

Legume seeds shall be inoculated with the proper, viable *Rhizobium* bacteria before planting. Inoculant shall be kept as cool as possible until used and shall not be used later than the date indicated on the package. When hydroseeding, use four times the recommended inoculant rate.

Seeding Methods. Seed shall be applied uniformly by hand, cyclone seeder, drill, cultipacker-seeder, or hydroseeder. The preferred method of seeding is by drilling or cultipacker-seeder method because these methods optimize seed to soil contact.

Seeding operations shall be done on the contour to the extent feasible. When a uniform distribution of seed is especially important (e.g., on lawns and athletic fields) and slopes are not extremely steep, seed shall be applied in two directions, each perpendicular to one another. One-half the seeding rate shall be applied in each direction.

Drill. Seed shall be planted by using a grass drill or cultipacker-type seeder. A grain drill may also be used if it can be calibrated to plant small seeds at the recommended planting rates. As noted above, grasses with fluffy seeds shall be planted by using a specially designed native seed drill. All drills shall have packer wheels, chains, or similar devices to close the seed slot and provide good seed to soil contact. Grasses shall not be planted more than 1/4 to 1/2-inch deep.

Broadcast. Seed may be broadcast by using a cyclone or whirlwind seeder or by hand. If spread by hand, small or light-seeded species such as redtop or bluestem may be mixed with filler (e.g., sawdust, rice, or slightly moistened peat moss) to achieve an even distribution. Seed shall be incorporated 1/8 to 1/4-inch deep by raking or dragging, cultipacking, or tracking with heavy machinery. Raked areas shall be rolled with a weighted roller to provide good seed to soil contact. Do not use broadcast seeding methods during windy conditions.

Hydroseeding. This method is best suited for steep, inaccessible areas where use of a drill or other mechanized equipment is not feasible. Hydroseeding shall be done in two separate operations, with seed and fertilizer applied in the first pass and mulch applied in the second pass. Do not use burnt or hydrated lime when hydroseeding. If legume inoculant is used, seeding shall be accomplished within 3 to 4 hours after slurry is mixed or a fresh supply of inoculant shall be added. After seeding, the area should be tracked up and down slope with heavy machinery, such as a bulldozer, to improve seed to soil contact.

Temporary Seeding and Nurse Crops. When the period of soil exposure is more than two months but less than twelve months, a temporary seeding (usually an annual grass) shall be used to provide short-term cover on disturbed areas. See Table 1 for recommended plant species and planting rates.

Temporary seedings shall be planted as a nurse crop with a permanent seeding mixture when rapidly growing cover is needed. When seeding toward the end of the listed planting dates for permanent seedings, or when conditions are expected to be less than optimal, select an appropriate nurse crop from Table 1 and plant with the permanent seeding mix. Companion seedings of small-seeded grasses shall not exceed 5% (by weight) of the overall permanent seeding mixture. Companion seedings of small grains such as barley, wheat, oats, or cereal rye shall be sown at one-third the rates listed in Table 1.

Oats are the recommended nurse crop for warm-season grasses. Do not use cereal rye as a nurse crop for warm-season grasses because it will inhibit their germination and growth.

When a temporary or permanent seeding cannot be completed because of weather conditions or time of year, mulch only shall be applied as a temporary cover when soil stabilization is needed. Refer to the Mulching section of this standard for application rates and methods.

Permanent Seeding. Permanent herbaceous vegetation shall be designed to achieve a minimum stand density of 85 percent Groundcover within one year.

Seed Mixes. To establish permanent cover, select grass and legume mixes according to the guidelines listed in Tables 3 and 4.

Planting Dates. Use Figure 1 and Table 2 to determine the recommended planting dates for selected mixes.

Supplemental Watering. If soil moisture is deficient, supply new seedings with adequate water (a minimum of 1/4-inch twice a day) until vegetation is well established. This is especially necessary in abnormally dry or hot weather or on droughty soils.

Mulching. Mulch shall consist of natural and/or artificial non-toxic materials, such as coconut fibers, wood shavings, straw, hay, bark chips, plastic, or fabric of sufficient thickness and durability to achieve the intended effect for the required time period. Tackifiers, emulsions, netting, pinning, or other methods of anchoring mulch shall be sufficiently durable to maintain mulch in place until it is no longer needed.

Mulch shall be used where needed to accomplish one or more of the following purposes:

1. Provide temporary erosion control when seeding must be delayed until the proper planting dates or until plantings become well established;

2. Conserve soil moisture to aid seed germination and plant survival;

3. Reduce weed growth in planted areas;

4. Reduce surface compaction or crusting and improve water infiltration.

All newly planted areas that are subject to erosion shall be mulched. If dense Groundcover is already present after planting (e.g., there is a previously seeded nurse crop sufficient to control soil erosion), then this mulching requirement shall be considered met.

Straw or Hay Mulch. Straw or hay shall be applied at the rate of 2 tons per acre (90 pounds per 1,000 square feet) immediately following seeding. Straw and hay shall be unweathered and free of any known viable seeds of objectionable weeds such as Johnsongrass, shattercane, thistle, or others as specified.

Spread mulch uniformly by hand or by mechanical methods so that approximately 85% of the soil surface is covered. This will provide erosion protection and allow adequate light penetration for seedling germination. Straw or hay shall not be chopped or finely broken during application.

On sites where mulch is exposed to displacement by wind and water, it shall be anchored immediately after placement. One of the following methods shall be used, depending on the size of the area, steepness of slope, and costs:

1. Mulch Netting. Cover mulch with degradable plastic, jute, or cotton netting. Staple the netting in place using wire staples;

2. Crimper. Use a tractor-drawn mulch anchoring coulter (crimper) to cut mulch into the soil surface, so as to anchor part of the mulch and leave part standing upright. Follow the general contours of the site when crimping mulch. Crimping operations are limited to areas accessible by tractor;

3. Liquid Mulch-Binders. Use one of the following:

    a. Organic and Vegetable-Based Binders. Mix with water and apply to mulch to form an insoluble polymer gel binder. Use at rates and under weather conditions as recommended by the manufacturer. These mulch binders shall be physiologically harmless and not impede the germination and growth of desired vegetation;

    b. Synthetic Binders. Mix with water and apply to mulch to form an insoluble high polymer synthetic binder. Use at rates and under weather conditions as recommended by the manufacturer.

Wood Fiber or Paper Fiber Mulch. Mulch made from wood, paper, or plant fibers shall be applied at the rate of 2,000 pounds per acre or as recommended by the product manufacturer. Mulch shall not contain any germination or growth inhibiting materials. It may be applied by hydroseeder but shall not be mixed in the tank with seed. Use shall be limited to flatter slopes and during optimum seeding periods in the spring and fall. Do not use on steep slopes or in concentrated flow areas.

Pelletized Mulch. Dry pellets of compressed and extruded paper and/or wood fiber products shall be applied by hand or mechanical spreader at the rate of 60 to 75 pounds per 1,000 square feet, in accordance with the manufacturer's recommendations. Pelletized mulch may contain co-polymers, tackifiers, fertilizers, and coloring agents. Apply 1/4 to 1/2-inch of water after spreading pelletized mulch to activate and expand the mulch and to provide sufficient soil coverage. This mulch material is especially applicable for small lawns or renovation areas where weed-free mulch is desirable or straw mulch and tackifiers are not practical.

Bark Mulch. Shredded hardwood bark mulch or bark chips shall be applied to a depth of 2 to 3 inches around plantings of trees, shrubs, Ground cover, and vines. Bark mulch and chips shall be well aged and shall be applied to provide at least 85% groundcover of the site. Shredded hardwood bark mulch, rather than bark chips, shall be used on steeper slopes because it is less subject to movement by water.

Soil Stabilization Matting. Soil stabilization matting shall have a uniform thickness and distribution of natural or biodegradable synthetic fibers or cords that freely allow penetration by water and plant seedlings. Matting shall resist decay for a minimum of 6 months. Matting shall not contain any harmful chemicals or other materials that may leach into the soil or reduce the germination and establishment of seedlings.

Matting products shall be applied on seeded areas and shall be secured to the soil surface according to the manufacturer's instructions. Soil stabilization matting is especially applicable where high water velocities are expected.

Sod.

Sod Quality and Treatment. Sod used shall be state certified sod that is at least one year old but not older than 3 years. Commonly available sod types include Kentucky Bluegrass blends and Tall Fescue/Kentucky Bluegrass mixes.

Sod shall be machine cut to uniform thickness of 3/4-inch, plus or minus 1/4-inch, at the time of cutting. Measurement of thickness shall exclude top growth or thatch.

Standard size sections of sod shall be strong enough to support their own weight and retain their shape when suspended vertically with a firm grasp of the upper 10% of the section.

Individual pieces of sod shall be cut to the supplier's width and length. Maximum allowable deviation from standard widths and lengths shall be no more than 5%.

Sod shall be harvested, delivered, and installed within a period of 36 hours. Sod not transplanted within this period shall be inspected and approved prior to its installation.

Sod shall not be harvested or transplanted when the moisture content (excessively wet or dry) may adversely affect its survival.

Planting Dates. Use Figure 1 and Table 2 to determine the appropriate planting dates for sod.

The optimum planting period is in early fall, followed by the spring planting period. Sod may be planted during the summer if supplemental watering will be provided until the sod is well established. The fall planting season is limited by the amount of time the sod has to develop roots before the ground freezes. Newly sodded areas usually need 4 to 6 weeks before the sod is sufficiently rooted. Similarly, the spring planting season is limited by the high temperatures and drought of summer, unless supplemental water will be provided.

Installation. Prior to sodding, the soil surface shall be cleared of roots, brush, trash, debris, and other objects that would interfere with planting. Based on a soil test, lime and fertilizer shall be evenly applied and mixed into the top 3 inches of soil. The site shall then be raked smooth in preparation for laying the sod.

During periods of high temperature, the soil shall be lightly watered immediately prior to laying the sod. Sod strips shall be laid lengthwise on the contour, never up and down the slope, starting at the bottom of the slope and working up. On steep slopes, the use of ladders will facilitate the work and prevent damage to the sod.

Sod strips shall be laid in staggered rows, with joints butted tightly together to prevent voids. Sod shall be rolled or tamped immediately following placement to insure solid contact of root mat and soil surface. Sod strips shall not be overlapped.

On slopes greater than 3:1, sod shall be secured to the soil surface with wooden pegs or wire staples.

Where surface water cannot be diverted from flowing over the face of a sodded slope, a capping strip of heavy jute or plastic netting, properly secured, shall be installed along the crown of the slope and edges to provide extra protection against lifting and undercutting of sod. The same technique shall be used to anchor sod in water-carrying channels and other critical areas. Wire staples shall be used to anchor netting in channel work.

Supplemental Watering. Immediately following installation, sod shall be watered until moisture penetrates the soil layer beneath the sod to a depth of 4 inches. Maintain optimum moisture for at least 2 weeks by lightly watering the sod on a regular (usually daily) basis, unless sufficient rainfall has occurred. Do not allow the sod to dry out completely. After the sod begins to take root, reduce the frequency of watering and increase the amount of water applied per watering. This encourages the development of a deep root system and ultimately reduces the amount of water needed.

Ground covers. On sites where grass is difficult to grow or maintain, other perennial ground covers may be used to control erosion.

Ground covers are low-growing herbaceous plants, vines, and creeping shrubs that spread quickly to form a dense cover. These plants should not be expected to provide erosion control or prevent soil slippage on sites that are inherently unstable due to soil texture, structure, water movement, or excessive slope.

Selection of Plant Species. Low maintenance ground cover are available to suit a variety of conditions, especially for small areas around homes and commercial buildings. These plants generally require more care than turf during the initial establishment period, but may require less care after establishment.

Species recommendations may be found by consulting publications in the "References" section of this standard. Be cautious of using species that have aggressive growth habits and may spread beyond the planted area, especially if the planting is near a neighboring property or a natural area such as a shoreline or woodland. Species such as English Ivy (*Hedera helix*) and Periwinkle (*Vinca minor*) tend to grow rapidly once established, and should not be used except under well-contained conditions.

Planting Dates. Use Figure 1 and Table 2 to determine the appropriate planting dates for the different types of plant materials.

Installation. Soil shall be prepared by incorporating 2 inches of compost or peat moss into the upper 8 inches of soil. If needed based on a soil test, lime and fertilizer shall also be incorporated into the soil. In the absence of a soil test for very small sites (e.g., in home landscaping areas), fertilizer may be added at the rate of 2 pounds of 5-10-10 grade fertilizer (or equivalent) per 100 square feet.

Install the plants at a spacing that is based on their present size, expected rate of growth, and how quickly a complete cover is desired. In general, spacing shall be one plant for every 1 to 4 square feet, using a staggered spacing between rows.

The entire planted slope shall be covered with a mulch that will provide sufficient erosion control during the establishment period. Refer to the Mulching section of this standard for application rates and methods.

Trees and Shrubs. If trees and shrubs will be used on a critical area, the soil surface shall be stabilized with mulch or with a low-growing herbaceous planting (e.g., creeping red fescue) to control erosion until the woody plants are large enough to serve that purpose.

Refer to the Conservation Practice Standard for Conservation Cover (Code 327) for a selected list of native tree and shrub species that may be used. Other trees and shrubs that are native to Delaware or are introduced and are non-invasive (i.e., not likely to spread beyond the planted area and displace native species), may also be suitable. Follow the establishment recommendations in the Delaware Job Sheet for Trees and Shrubs.

For selection and use of trees and shrubs as part of a soil bioengineering system for upland slopes, refer to Chapter 18 of the Engineering Field Handbook.

OPERATION AND MAINTENANCE

General Requirements for All Plantings. Corrective actions shall be taken as needed to replace destroyed plant material or dislodged mulching material. Reshape the soil surface and replant areas where prolonged slope instability is present. Where vegetative efforts have failed, reassess the need for structural measures to complement vegetative measures.

Invasions by undesirable plants shall be controlled by pulling, mowing, or spraying with a selective herbicide. Where wildlife habitat is a concern, do not mow during the primary nesting season (April 15 to August 15). Noxious weeds shall be controlled as required by state law.

Inspect for insects and disease and if an incidence threatens stand survival, take corrective action to bring the pest under control.

Grasses and Legumes. During the establishment period, plantings shall be monitored for germination success, water stress, pest problems, and damage by erosion. After one full year from planting, all areas with less than 85% plant cover shall be replanted according to the following recommendations:

1. If the stand provides less than 40% Groundcover, reestablish following the

original seedbed preparation, lime, fertilizer, and seeding recommendations;

2. If the stand provides 40 to 84% Groundcover, overseed and fertilize using one-half the original rate. On small areas, reseeding may be accomplished by broadcasting and lightly raking the seed. For larger areas, use of a grass drill or cultipacker-seeder is preferable.

Spring seedings may require an application of fertilizer according to soil test recommendations, between September 1 and October 15, at least every two years. In lieu of a soil test, apply 30 pounds per acre (0.7 pounds per 1,000 square feet) of N, P_20_5 and K_20.

Fall seedings should not be fertilized when planted, but may require the above fertilization between March 15 and May 1 of the following spring.

Mixtures dominated by legumes may only need topdressing once every three years according to soil test recommendations.

If a slow release form of nitrogen (such as Ureaform or Osmocote) was used, a follow-up topdressing of nitrogen may not be necessary for several years.

Lime according to soil test recommendations at least once every five years. In lieu of a soil test, apply lime at the rate of 1 ton per acre (45 pounds per 1,000 square feet).

Ground covers. Use a soil test analysis to determine the need for lime and fertilizer. In lieu of a soil test, a general recommendation is to apply 2 to 3 pounds per 100 square feet of 5-10-10 fertilizer in the fall or early spring. Spread 2 to 3 inches of organic mulch, such as shredded hardwood bark or bark chips, to reduce evaporation of moisture from the soil and help reduce invasion by weeds.

Use hand tools to remove weeds from between plants. Some perennial weeds, such as thistle and dandelion, may require spot treatment with a nonselective broadleaf herbicide. Care must be taken to avoid herbicide contact with the desired ground cover. Follow all label directions when using herbicides.

Trees and Shrubs. Follow the maintenance recommendations in the Delaware Job Sheet for Trees and Shrubs.

SUPPORTING DATA AND DOCUMENTATION

General Requirements for All Plantings. The following is a list of the minimum data and documentation to be recorded in the case file:

1. Extent of planting in acres, field number where the practice located, and the location of the practice marked on the conservation plan map.

2. Assistance notes.

3. Completed copy of the appropriate Job Sheet(s) or other specifications and management plans. The following items shall be addressed, as appropriate:

   a. Method of site preparation and type of seedbed preparation;

   b. Species and rates to be seeded/planted;

   c. Seeding/planting dates;

   d. Rate and type of soil amendments to be applied;

   e. Rate and type of mulch and anchoring methods.

Additional Documentation for Construction Check Data/As-Built. In addition to the general requirements listed above, the following is a list of minimum documentation to be included in the case file when Critical Area Planting, Code 342, is used to specify the planting component of structural practices:

1. Assistance notes shall include inspection date(s), name of the person who performed the inspection(s), specifics as to what was inspected, alternatives and adjustments discussed, decisions made, and by whom;

2. Dimensions of the stabilized area;

3. Certification statement on seeding and planting;

4. Final quantities and documentation for any quantity changes. Include materials certification when requested;

5. Sign and date check notes and plans to include the statement that the practice meets or exceeds the requirements of the NRCS conservation practice standard.

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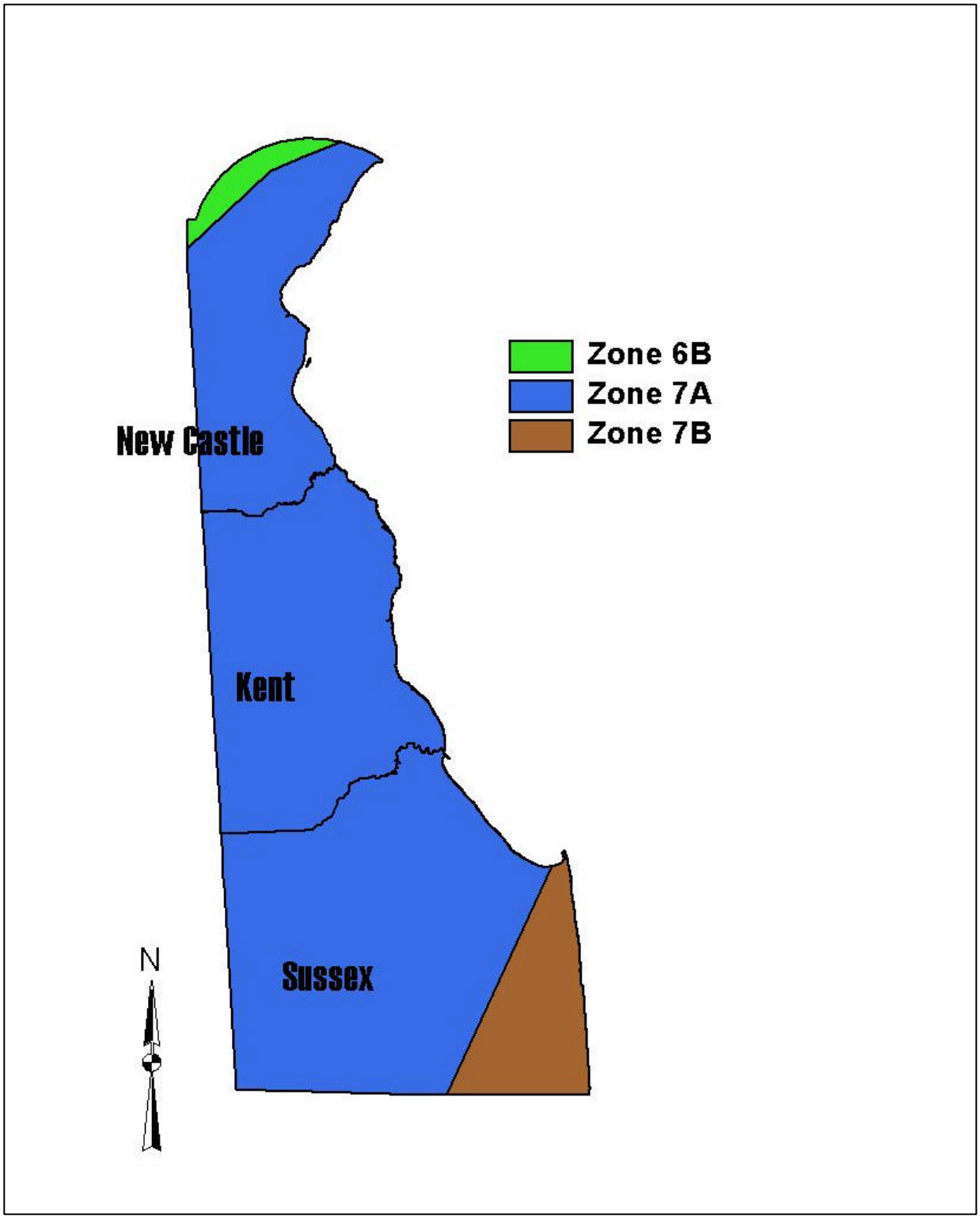
FIGURE 1: USDA Plant Hardiness Zones for Delaware



Plant Hardiness Zones delineate areas where a species can be successfully established based on average annual minimum temperatures.

TABLE 1: Temporary Seeding for Site Stabilization

Plant Species	Seeding Rate [1/]		Seeding Depth (inches) [2/]	Recommended Seeding Dates by Plant Hardiness Zone [3/]	
	lbs./ac.	lbs./ 1,000 sq.ft.		6b	7a and 7b
Cool-Season Grasses					
Annual Ryegrass *Lolium perenne* ssp. *multiflorum*	40	1.0	0.5	Mar 1 to May 15 Aug 1 to Oct 15	Feb 15 to Apr 30 Aug 15 to Nov 30
Barley *Hordeum vulgare*	96	2.2	1.0	Mar 1 to May 15 Aug 1 to Oct 15	Feb 15 to Apr 30 Aug 15 to Nov 30
Oats *Avena sativa*	72	1.7	1.0	Mar 1 to May 15 Aug 1 to Oct 15	Feb 15 to Apr 30 Aug 15 to Nov 30
Wheat *Triticum aestivum*	120	2.8	1.0	Mar 1 to May 15 Aug 1 to Oct 15	Feb 15 to Apr 30 Aug 15 to Nov 30
Cereal Rye *Secale cereale*	112	2.8	1.0	Mar 1 to May 15 Aug 1 to Nov 15	Feb 15 to Apr 30 Aug 15 to Dec 15
Warm-Season Grasses					
Foxtail Millet *Setaria italica*	30	0.7	0.5	May 15 to Jul 31	May 1 to Aug 15
Pearl Millet *Pennisetum glaucum*	20	0.5	0.5	May 15 to Jul 31	May 1 to Aug 15

TABLE 1 NOTES:

1. Seeding rates for the warm-season grasses are in pounds of Pure Live Seed (PLS). Actual planting rates shall be adjusted to reflect percent seed germination and purity, as tested. No adjustments are necessary for the cool-season grasses.

   Seeding rates listed above are for temporary seedings, when planted alone. When planted as a nurse crop with permanent seed mixes, use 1/3 the seeding rate listed above for barley, oats, wheat, and cereal rye. For smaller-seeded grasses (annual ryegrass, pearl millet, foxtail millet), do not exceed more than 5% (by weight) of the overall permanent seeding mix.

   Oats are the recommended nurse crop for warm-season grasses. Do not use cereal rye with warm-season grasses; it has been shown to have allelopathic properties that inhibit the germination and growth of warm-season grasses.

2. For sandy soils, plant seeds at twice the depth listed above.

3. The planting dates listed are averages for each Zone and may require adjustment to reflect local conditions, especially near the boundaries of the zone.

TABLE 2: Recommended Planting Dates for Permanent Cover in Delaware [1/]

Type of Plant Material	Plant Hardiness Zones	
	6b	7a and 7b
Seeds - Cool-Season Grasses (including mixes with forbas and/or legumes)	Mar 1 to May 15 Aug 1 to Oct 15	Feb 1 to Apr 30 Aug 15 to Oct 31 Nov 1 to Nov 30♦
Seeds – Warm-Season/Cool-Season Grasses (including mixes with forbs and.or legumes)	Mar 1 to May 15♦ ♦ May 15 to Jun 15*	Feb 15 to Apr 30♦ ♦ May 1 to May 31*
Sod – Cool-Season	Mar 1 to May 15 May 15 to Sep 15* Sep 15 to Nov 15∗+	Feb 15 to Apr 30 May 1 to Sep 30* Oct 1 to Dec 1∗+
Unrooted Woody Plant Materials; Bare-Rooted Plants; Bulbs, Rhizomes, Corms, and Tubers	Mar 1 to May 15 May 15 to Jun 30*	Feb 15 to Apr 30 May 1 to Jun 30*
Containerized Stock; Balled and Burlap Stock	Mar 1 to May 15 May 15 to Jun 30* Sep 15 to Nov 30*+	Feb 15 to Apr 30 May 1 to Jun 30* Oct 1 to Dec 15*+

TABLE 2 NOTES:

1. The planting dates listed are averages for each zone. These dates may require adjustment to reflect local conditions, especially near the boundaries of the zones. When seeding toward the end of the listed planting dates, or when conditions are expected to be less than optimal, select an appropriate nurse crop from Table 1 and plant with the permanent seeding mix. (See Table 1, Note 1 for more information.)
2. When planted during the grwoing season, most of these materials must be purchased and kept in a dormant condition until planting. Bare-rooted grasses are the exception-they may be supplied as growing (non-dormant) plants.

♦ Additional planting dates for the lower Coastal Plain, dependent on annual rainfall and temperature trends. Recommend adding a nurse crop, as noted above, if planting during this period.

♦ ♦ Warm-season grasses need a soil temperature of at least 50 degrees F in order to germinate. If soil temperatures are colder than 50 degrees, or moisture is not adequate, the seeds will remain dormant until conditons are favorable. In general, planting during the latter protion of this perios allows more time for weed emerence and weed control prior to planting. When selecting a planting date, consider the need for weed control vs. the likelihood of having sufficient mositure for later plantings, expecially on droughty sites.

∗Additional planting dates during which supplemental watering may be needed to ensure plant establishment.
+Frequent freezing and thawing of wet soils may result in frost-heaving of materials planted in late fall, if plants have not sufficiently rooted in place. Sod usually needs 4 to 6 weeks to become sufficiently rooted. Large containerized and balled and burlap stock may be planted into the winter months as long as the ground is not frozen.

TABLE 3: Recommended Permanent Seeding Mixtures by Site Condition or Purpose

Site Condition or Purpose of the Planting	Recommended Mix (see Table 4)												
	1	2	3	4	5	6	7	8	9	10	11	12	13
Steep Slopes, Roadsides	✓	✓	✓	◆	✓	◆				◆	◆	✓	✓
Sand and Gravel Pits, Sanitary Landfills	✓	✓	✓	◆	✓	◆				◆	◆	✓	
Salt-Damaged Areas	◆												✓
Mine Spoil, Dredged Material, and Spoil Banks	◆		✓	◆	◆								
Utility Rights-of-Way	✓	✓	✓	✓	✓	✓	◆			✓	✓	✓	
Dikes and Dams	◆	◆	✓	◆		✓	✓	◆		✓	✓	✓	
Berms, Low Embankments (not on Ponds)	✓	✓	✓	✓	✓	✓	◆	◆		✓	✓	✓	◆
Pond and Channel Banks, Streambanks	✓	✓	✓	✓	◆	◆	◆			◆	◆		
Grassed Waterways, Diversions, Terraces, Spillways	◆				◆	✓	✓	◆	✓		✓		◆
Bottom of Drainage Ditches, Swales, Detention Basins				◆		✓	◆			◆	✓		✓
Field Borders, Filter Strips, Contour Buffer Strips	✓	✓	✓	◆	◆	✓	◆	✓	✓	✓	✓	✓	◆
Wastewater Treatment Strips and Areas								✓	◆	◆			
Athletic Fields, Residential and Commercial Lawns							◆	✓	✓		✓		
Recreation Areas							✓	✓	✓		✓		

TABLE 3 NOTES:

✓ Recommended mix for this site condition or purpose.

◆ Alternative mix, depending on site conditions.

TABLE 4: Permanent Herbaceous Seeding Mixtures

Mix	Recommended Cultivar	Seeding Rate [1/]		Soil Drainage Class [2/]	Max. Height (feet)	Maint. Level [3/]	Remarks
		lbs./ac.	lbs./ 1000 sq .ft.				
WARM-SEASON/COOL-SEASON GRASS MIXES							
1. SELECT ONE WARM-SEASON GRASS:							
Switchgrass *Panicum virgatum* **OR**	Blackwell, Carthage, Cave-in-Rock, or Shelter	10	0.23				All species are native to Delaware. Plant this mix with a regular grass drill. Coastal panicgrass is best adapted to Zones 7a and 7b. Creeping red fescue is a cool-season grass that will provide erosion protection while the warm-season grass is becoming established. Switchgrass, coastal panicgrass, the 'Dawson' variety of creeping red fescue, and partridge pea are moderately salt-tolerant. Bush clover and wild indigo do not tolerate wet sites.
Coastal Panicgrass *Panicum amarum*	Atlantic	10	0.23				
AND ADD:							
Creeping Red Fescue *Festuca rubra* var. *rubra*	Dawson, Pennlawn, Flyer, Fortess, Ruby, or Salem	15	0.34	E – P	4 - 7	C - D	
PLUS ONE OF THE FOLLOWING LEGUMES:							
Partridge Pea *Chamaecrista fasciculata*	Common	4	0.09				
Bush Clover *Lespedeza capitata*	Common	2	0.05				
Wild Indigo *Baptisia tinctoria*	Common	2	0.05				
2. Big Bluestem *Andropogon gerardii*	Niagara or Rountree	6	0.14				All species are native to Delaware. The indiangrass and bluestems have fluffy seeds. Plant with a specialized native seed drill. Creeping red fescue is a cool-season grass that will provide erosion protection while the warm-season grasses are becoming established.
Indiangrass *Sorghastrum nutans*	Rumsey	6	0.14				
Little Bluestem *Andropogon gerardii*	Aldous or Blaze	4	0.09				
Creeping Red Fescue *Festuca rubra* var. *rubra*	Dawson, Pennlawn, Flyer, Fortess, Ruby, or Salem	15	0.34	E – MW	6 - 8	C - D	
PLUS ONE OF THE FOLLOWING LEGUMES:							
Partridge Pea *Chamaecrista fasciculata*	Common	4	0.09				
Bush Clover *Lespedeza capitata*	Common	2	0.05				
Wild Indigo *Baptisia tinctoria*	Common	2	0.05				
Showy Tick-Trefoil *Desmodium canadense*	Common	1	0.02				

TABLE 4: Permanent Herbaceous Seeding Mixtures

Mix	Recommended Cultivar	Seeding Rate [1/]		Soil Drainage Class [2/]	Max. Height (feet)	Maint. Level [3/]	Remarks
		lbs./ac.	lbs./ 1000 sq .ft.				
WARM-SEASON/COOL-SEASON GRASS MIXES							
3. SELECT THREE GRASSES:							
Deertongue *Dicanthelium clandestinum*	Tioga	20	0.46				Excellent for excessively droughty, low pH (acidic) soils.
Sheep Fescue *Festuca ovina* **OR**	Attila or Aurora	20	0.46				Sheep fescue, Canada wild rye, and redtop are cool-season grasses that will provide erosion protection while the warm-season grass (deertongue) is becoming established.
Canada Wild Rye *Elymus canadensis*	Common	3	0.07				
Redtop *Agrostis gigantea*	Streaker	1	0.02	E - MW	4 - 6	C - D	
PLUS ONE OF THE FOLLOWING LEGUMES:							
Round bushclover *Lespedeza capitata*		2	0.11				
Wild Indigo *Baptisia tinctoria*		2	0.11				
4. Deertongue *Dicanthelium clandestinum*	Tioga	15	0.34				
Creeping Red Fescue *Festuca rubra* var. *rubra*	Dawson, Pennlawn, Flyer, Fortess, Ruby, or Salem	20	0.46	W - P	2 - 3	C - D	
Virginia Wild Rye *Elymus virginicus* **OR**	Common	5	0.11				Use Virginia wild rye on moist, shady sites.
Canada Wild Rye *Elymus canadensis*	Common	5	0.11				Use Canada wild rye on droughty sites.

TABLE 4: Permanent Herbaceous Seeding Mixtures

Mix	Recommended Cultivar	Seeding Rate [1/] lbs./ac.	Seeding Rate [1/] lbs./ 1000 sq .ft.	Soil Drainage Class [2/]	Max. Height (feet)	Maint. Level [3/]	Remarks
COOL-SEASON GRASS MIXES							
5. SELECT TWO GRASSES:							
Creeping Red Fescue *Festuca rubra* var. *rubra* **OR**	Dawson, Pennlawn, Flyer, Fortess, Ruby, or Salem	20	0.46				Use creeping red fescue or hard fescue in heavy shade, but only hard fescue in sunny conditions and/or droughty soils.
Hard Fescue *Festuca trachyphylla*	Common or Bighorn	20	0.46				Perennial ryegrass and redtop will establish more rapidly than either fescue. Redtop tolerates wet sites better than ryegrass.
Perennial Ryegrass *Lolium perenne* **OR**	Blazer (II), Pennfine	10	0.23	E - SP	2 - 3	B - D	
Redtop *Agrostis gigantea*	Streaker	1	0.02				Flatpea will suppress woody vegetation. It should be planted in the spring or as a dormant seeding (overseeding) in late fall or winter. It may not be winter-hardy if planted late summer - fall.
AND ADD THE FOLLOWING LEGUME:							
Flatpea *Lathyrus sylvestris*	Lathco	15	0.34				
6. Tall Fescue *Lolium arundinaceum* (formerly *Festuca arundinacea)*	Recommended DE turf-types	40	0.93				
Perennial Ryegrass *Lolium perenne*	Blazer (II), Pennfine	25	0.57				
PLUS ONE OF THE FOLLOWING LEGUMES:				W - SP	2 - 3	C - D	
Tick Trefoil *Desmodium canadense*	Common	1	0.02				
White Clover *Trifolium repens*	Common	5	0.11				
7. Creeping Red Fescue *Festuca rubra* var. *rubra*	Dawson, Pennlawn, Flyer, Fortess, Ruby, or Salem	60	1.38				
Kentucky Bluegrass *Poa pratensis*	Recommended DE turf-types	15	0.34	W - MW	1 - 2	C - D	This mix has good shade tolerance.

TABLE 4: Permanent Herbaceous Seeding Mixtures

Mix	Recommended Cultivar	Seeding Rate [1/]		Soil Drainage Class [2/]	Max. Height (feet)	Maint. Level [3/]	Remarks
		lbs./ac.	lbs./ 1000 sq .ft.				
COOL-SEASON GRASS MIXES							
8. Tall Fescue *Lolium arundinaceum* (formerly *Festuca arundinacea)*	Recommended DE turf-types	100	2.3	E - SP	2 - 3	A - D	Tall fescue produces a dense turf if frequently mowed, but tends to be clumpy if mowed only occasionally. For best results, recommend using a blend of 3 cultivars.
9. SELECT ONE SPECIES OF FESCUE:							Good for highly managed athletic fields.
Tall Fescue *Lolium arundinaceum* **OR** (formerly *Festuca arundinacea)*	Recommended DE turf-types	60	1.38				Tall fescue is more suitable for compacted, high use areas and on moist sites.
Hard Fescue *Festuca trachyphylla*	Common or Bighorn	40	0.92				Hard fescue produces finer-textured turf with more shade tolerance.
AND ADD:				W - SP	2 - 3	A - B	
Kentucky Bluegrass *Poa pratensis*	Recommended DE turf-types	40	0.92				Use tall fescue instead of hard fescue for wastewater treatment strips and areas.
Perennial Ryegrass *Lolium perenne*	Blazer (II), Pennfine	20	0.46				For best results, recommend using a blend of 3 cultivars each for tall fescue and Kentucky bluegrass.
10. Orchardgrass *Dactylis glomerata*	Any	25	0.57				Low maintenance mix that is easy to establish.
Creeping Red Fescue *Festuca rubra* var. *rubra*	Dawson, Pennlawn, Flyer, Fortess, Ruby, or Salem	10	0.23				
Redtop *Agrostis gigantea*	Streaker	1	0.02	W - SP	2 - 3	C - D	
Alsike Clover *Trifolium hybridum*	Common	3	0.07				Omit the clovers if using this mix for wastewater treatment strips and areas.
White Clover *Trifolium repens*	Common	3	0.07				

TABLE 4: Permanent Herbaceous Seeding Mixtures

Mix	Recommended Cultivar	Seeding Rate [1/]		Soil Drainage Class [2/]	Max. Height (feet)	Maint. Level [3/]	Remarks
		lbs./ac.	lbs./ 1000 sq .ft.				
COOL-SEASON GRASS MIXES							
11. Creeping Red Fescue *Festuca rubra* var. *rubra*	Dawson, Pennlawn, Flyer, Fortess, Ruby, or Salem	30	0.69				Suitable mix for shady turf area.
Chewings Fescue *Festuca rubra* ssp.*commutata*	Common	30	0.69				
Kentucky Bluegrass *Poa pratensis*	Recommended DE turf-types	20	0.46	E - MW	2 - 3	B - D	
OPTIONAL ADDITION							
Rough Bluegrass *Poa trivialis*	Common	15	0.34				Add rough bluegrass in moist, shady conditions only.
12. Creeping Red Fescue *Festuca rubra* var. *rubra*	Dawson, Pennlawn, Flyer, Fortess, Ruby, or Salem	25	0.57				Attractive mix of fine fescues and wildflowers for low maintenance conditions. Once well established, the grasses may tend to outcompete the wildflowers.
Hard Fescue *Festuca trachyphylla*	Common or Bighorn	25	0.57				
Sheep Fescue *Festuca ovina*	Attila or Aurora	25	0.57				Wildflowers are best established by broadcasting and cultipacking on a prepared seedbed. Drilling can be also used, but care must be taken so that seeds are not drilled too deep.
PLUS WILDFLOWER MIX:							
Black-eyed Susan *Rudbeckia hirta*	Common	2	0.05	E - MW	2 - 3	C - D	Hydroseeding is not recommended for this mix if wildflowers are used because of their very small seed.
Lance-leaved Coreopsis *Coreopsis lanceolata*	Common	2	0.05				
Purple Coneflower *Echinacea purpurea*	Common	2	0.05				
Partridge Pea *Chamaecrista fasciculata*	Common	5	0.11				
OR ADD CLOVER MIX:							
White Clover *Trifolium repens*	Common	3	0.07				
Red Clover *Trifolium pratense*	Any	3	0.07				

TABLE 4: Permanent Herbaceous Seeding Mixtures

Mix	Recommended Cultivar	Seeding Rate [1/]		Soil Drainage Class [2/]	Max. Height (feet)	Maint. Level [3/]	Remarks
		lbs./ac.	lbs./ 1000 sq .ft.				
COOL-SEASON GRASS MIXES							
13. Alkali Saltgrass *Puccinellia distans*	Fults or Salty	20	0.46	W - P	2 - 3	B - D	This is the recommended mix for saline sites. Saltgrass will persist only under saline conditions. For best results, use only the 'Dawson' variety of creeping red fescue. It is a salt-tolerant variety.
Creeping Red Fescue *Festuca rubra* var. *rubra*	Dawson	15	0.34				
Fowl Meadowgrass *Poa palustris*	Common	2	0.05				
OPTIONAL ADDITION							
Creeping Bentgrass *Agrostis stolonifera*	Seaside	2	0.05				Add bentgrass for wetter conditions.

TABLE 4 NOTES:

1. Seeding rates for the warm-season grasses are in pounds of Pure Live Seed (PLS). Actual planting rates shall be adjusted to reflect percent seed germination and purity, as tested. No adjustments are necessary for the cool-season grasses, legumes, or wildflowers. All legume seeds shall be inoculated before planting with the appropriate *Rhizobium* bacteria.

2. Soil Drainage Class (refer to the county soil survey for further information):

   E - Excessively Drained
   W - Well Drained
   MW - Moderately Well Drained
   SP - Somewhat Poorly Drained
   P - Poorly Drained

3. Maintenance Level:

   A - Intensive mowing (every 2 - 4 days), fertilization, lime, insect and weed control, and watering (examples: high maintenance lawns and athletic fields).
   B - Frequent mowing (every 4 - 7 days), occasional fertilization, lime, pest control, and watering (examples: residential, school, and commercial lawns).
   C - Periodic mowing (every 7 - 14 days), occasional fertilization and lime (examples: residential lawns, parks).
   D - Infrequent or no mowing, fertilization, or lime after the first year of establishment (examples: wildlife areas, roadsides, steep banks)

TABLE 5: Quality of Seed

Species	Minimum Seed Purity (%)	Minimum Seed Germination (%)	Species	Minimum Seed Purity (%)	Minimum Seed Germination (%)
COOL-SEASON GRASSES			*WARM-SEASON GRASSES*		
Barley	98	85	Bluestem, Big	60	60
Bentgrass, Creeping	95	85	Bluestem, Little	55	60
Bluegrass, Canada	90	80	Deertongue	95	75
Bluegrass, Kentucky	97	80	Indiangrass	60	60
Bluegrass, Rough	96	80	Millet, Foxtail or Pearl	98	80
Fescue, Chewings	97	85	Panicgrass, Coastal	95	70
Fescue, Creeping Red	97	85	Switchgrass	95	75
Fescue, Hard	97	85	*LEGUMES/FORBS*		
Fescue, Sheep	97	85	Clover, Alsike	99	85
Fescue, Tall	97	85	Clover, Bush	--	--
Meadowgrass, Fowl	--	--	Clover, Red	99	85
Oats	98	85	Clover, White	98	90
Orchardgrass	90	80	Flatpea	98	75
Redtop	92	80	Indigo, Wild	--	--
Rye, Cereal	98	85	Pea, Partridge	98	70
Ryegrass, Annual or Perennial	97	85	Tick-Trefoil, Showy	--	--
Saltgrass, Alkali	85	80	Trefoil, Birdsfoot	98	85
Wheat	98	85	Wildflowers	--	--
Wild Rye, Canada	85	70			
Wild Rye, Virginia	--	--			

TABLE 5 NOTE:

1. All seed shall comply with the Delaware State Seed Law. Seed shall be free of prohibited or restricted noxious weeds, as currently listed by the Delaware Department of Agriculture, Turf and Seed Section.